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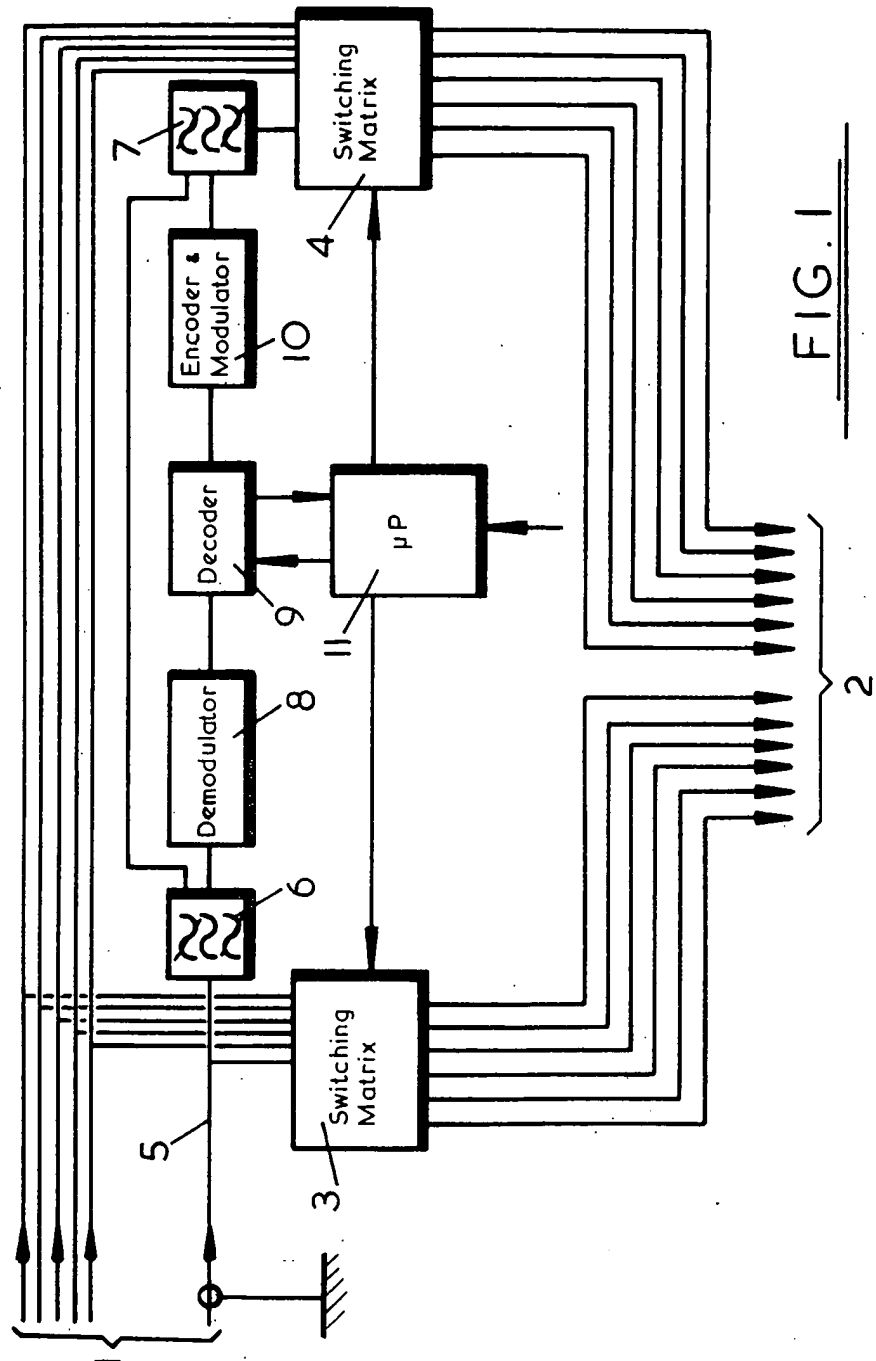
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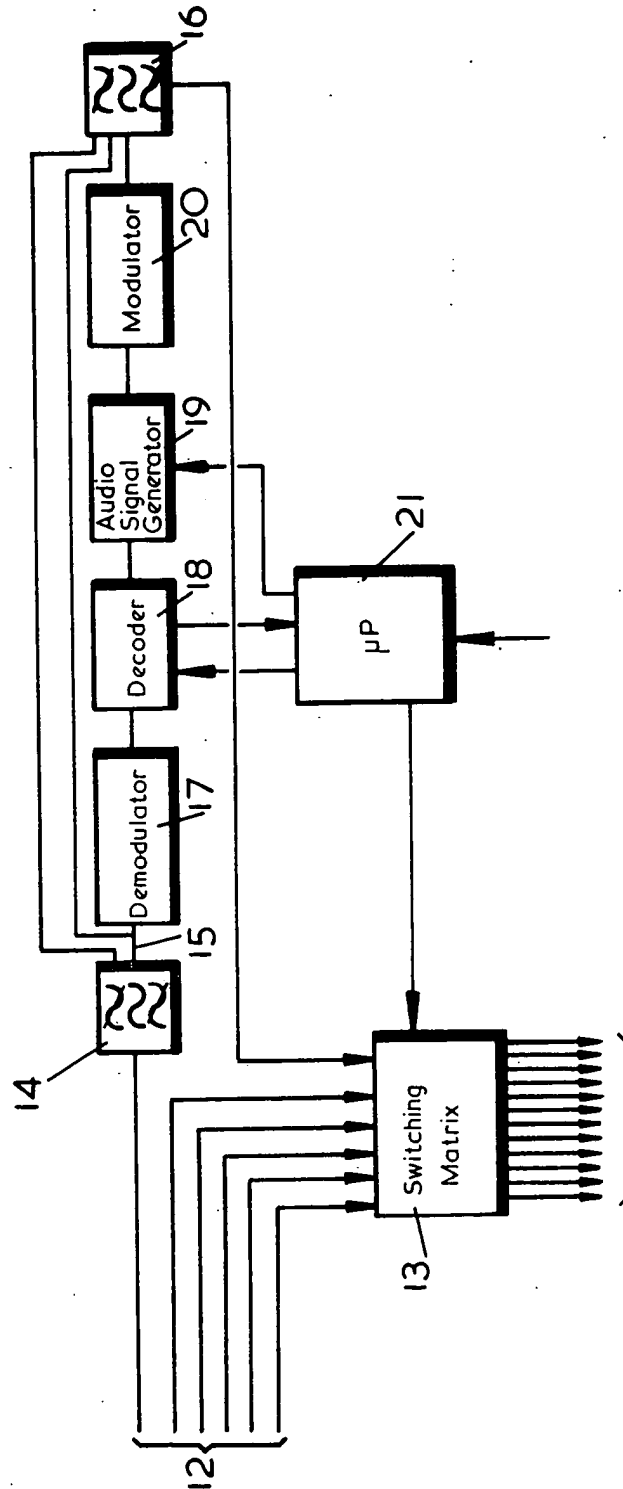
(71) Applicant
Communications Patents Limited (United Kingdom),
PO Box 451, Carlton House, Lower Regent Street,
London SW1Y 4LS(72) Inventors
Henry Louis Baker,
Raymond Scrivens(74) Agent and/or Address for Service
Wheatley & Mackenzie,
Scottish Life House, Bridge Street,
Manchester M3 3DP(51) INT CL⁴
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(57) A communications system comprising a head end, a plurality of subscribers each provided with a television receiver, a trunk cable network connecting the head end to a plurality of switching centres, and a plurality of subscriber cables connecting the subscribers to the switching centres. Signals are transmitted over the trunk network from the head end and switched to individual subscribers from the switching centres in response to control signals transmitted to the switching centres from individual subscribers. A digital signal is transmitted from the head end to the switching centres, the digital signal being representative of a message to be delivered to a particular subscriber. The digital signal is converted at the switching centre to an analogue signal suitable for reproduction by a television receiver, and the subscribers cable is connected to the converted output so as to deliver the message to the subscriber. The digital signal may be a teletext signal, and only those subscribers not having receivers capable of receiving such signals are connected to receive the converted output.

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FIG. 2

SPECIFICATION.

Communications system

5 The present invention relates to a communications system.

Communications systems incorporating teletext facilities are now well known. In such systems a teletext signal is transmitted to a television receiver, 10 the signals are stored in the receiver, and text representative of the stored signals is displayed by the receiver when it is switched to the teletext mode. In most cases the teletext signals are transmitted during otherwise unused lines of a standard television signal transmission.

Most television receiver manufacturers have decided to provide teletext facilities on all the receivers they produce. It can therefore be assumed that most receivers entering service will have such facilities.

20 There are many television receivers already in use however which do not have teletext facilities and this will remain the case for a prolonged period.

Cable television systems have been developed which offer sophisticated services that enable individual subscribers to interact with the system by transmitting data via the system and receiving data in response. One such system is described in our European Patent Specification No. 0 094 794. In the described system various services are available to 30 subscribers which rely upon teletext signals to transmit information to individual subscribers. Unfortunately subscribers without teletext receivers will not be able to use those services and might be reluctant to purchase teletext equipment simply to gain access to these services.

It is an object of the present invention to provide a communications system in which data can be transmitted to subscribers using teletext-type signals even if the subscribers do not have conventional 40 teletext receivers.

According to the present invention, there is provided a communications system comprising a head end, a plurality of subscriber outlets each provided with a television receiver, a trunk cable network 45 connecting the head end to a plurality of switching centres, and a plurality of subscriber cables connecting the subscribers to the switching centres, signals transmitted over the trunk network from the head end being switched to individual subscribers from the switching centres in response to control signals transmitted to the switching centres from individual subscribers, wherein means are provided at the head end for transmitting to the switching centres a digital signal representative of a message to be 55 delivered to any one subscriber, means are provided at the switching centres for converting the digital signal to an analogue signal suitable for reproduction by a television receiver, and means are provided at the switching centres for selectively connecting 60 the output of the converting means to the cable of the said one subscriber.

It will be appreciated that the term "cable" is used herein in a broad sense to include conductive signal paths such as coaxial cables and optical signal paths 65 such as optic fibres and combinations of the two.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

70 *Figure 1* is a schematic illustration of equipment located at a switching centre in a system in which messages are transmitted in the form of teletext message signals; and

75 *Figure 2* is a schematic illustration of equipment located at a switching centre in a system in which messages are in the form of digitally coded audio message signals.

Referring to *Figure 1*, in the illustrated system thirty channels are provided, five VHF frequency distinguished channels being allocated to each of six 80 inputs 1. Twelve subscribers are supplied with signals from the illustrated switching centre via cables 2, six subscribers having receivers capable of displaying teletext messages being connected to a switching matrix 3 and six subscribers having receivers not capable of displaying teletext messages 85 being connected to switching matrix 4. It will be appreciated that normally more than twelve subscribers will be served by a single switching centre, but only twelve subscriber outputs 2 are shown in *Figure 1* to simplify the drawing.

Each switching matrix is arranged to select one of the desired channels by firstly selecting the desired packet of five VHF signals and secondly by selecting the desired signal from the previously selected 95 packet of signals. Such an arrangement is known from the above mentioned European Patent Specification.

One of the thirty channels carries a full channel and/or field teletext signal and this channel appears 100 on line 5. Line 5 is connected directly to the switching matrix 3 so that a digital teletext message intended for a subscriber having a receiver capable of receiving teletext signals directly can have messages intended for him switched straight through to him. For subscriber receivers not capable of receiving 105 teletext direct however, the teletext channel is separated from the four other channels on line 5 by a diplexer 6. The four other channels are passed to the switching matrix 4 via another diplexer 7 whereas the teletext channel signal is applied to a demodulator 8.

The demodulator 8 demodulates the teletext signal and applies the demodulated signal to a decoder 9 the output of which feeds an encoder and modulator 10. The modulation output is on the original 115 teletext channel frequency but is an analogue signal which when displayed by a conventional receiver is identical to a display of the original teletext signal by a teletext receiver. The modulator output is applied 120 to the switching matrix with the other four channels received on line 5 via diplexer 7.

When it is desired to respond to a particular subscriber, the head end (not shown) instructs a microprocessor 11 accordingly. If that subscriber 125 does not have a teletext receiver, the microprocessor 11 enters the page and subpage number dedicated to that subscriber in the decoder 9. When the message data has been acquired, the microprocessor 11 receives a control input to switch the matrix 4 130 appropriately. The subscriber then receives the

analogue "teletext" signal and the decoded message is displayed. On the other hand, if the particular subscriber has a teletext receiver, the microprocessor 11 switches the signal directly to the subscriber via matrix 3.

Thus, the described system utilises the same method of message communication to the switching centres for all subscribers, but makes provision for subscribers having both teletext and non-teletext receivers. In the event that all subscribers to a switching centre have teletext receivers components 4, 8, 9 and 10 can be dispensed with. The system is thus fully flexible.

Referring now to Figure 2, the illustrated system provides for the delivery of audio responses to subscribers not having teletext receivers. As in the above embodiment, subscribers with teletext receivers can receive teletext messages directly.

Six packets of five VHF frequency distinguished signals are supplied via inputs 12. Five of these inputs are applied directly to a switching matrix 13, the sixth being applied to a diplexer 14. One of the five packets contains a first service channel in the form of a standard television signal comprising a vision signal and an accompanying sound signal. The sixth packet contains a second service channel which comprises a vision signal only, i.e. there is no accompanying sound signal. The vision signals on the first and second service channels are arranged to produce similar visual impressions on the screen of a subscriber's television receiver, although the second service channel vision signal includes when required teletext signals arranged to control the delivery of audio responses to a subscriber's receiver. As a matter of convenience both service channels are arranged to be at the same VHF frequency on their respective inputs 12 although this is not essential.

Both service channels comprise a vision signal giving details of the service available on the system and the accompanying sound signal of the first service channel delivers a verbal description of the services or music.

The diplexer 14 separates the second service channel from the other four channels of the sixth packet and applies it over line 15 both to a diplexer 16 and a demodulator 17 feeding a teletext decoder 18. The decoder output controls an audio generator 19; the output of which is applied to a modulator 20 to provide a sound signal to accompany the vision signal of the second service channel. This sound signal is applied to the diplexer 16 together with the vision signal of the second service channel present on line 15 and the remaining four channels of the sixth packet. The output of the diplexer 16 is fed to the switching matrix 13 at which the second service channel appears to a subscriber's receiver as a standard television signal.

The audio generator 19 may be for example a speech synthesiser or a simple digital to analogue audio converter. If the audio generator is a speech synthesiser, this can have a vocabulary of say 50 to 10 words; each of which is identified by a unique number. To deliver an audio response to a subscriber the appropriate string of numbers is represented

by teletext signals supplied from the head end over the second service channel.

Any subscriber selecting the service channel is normally connected by the microprocessor 21 to the first service channel. If the subscriber is not equipped with a teletext receiver and makes a request to which a response is desired the microprocessor 21 is arranged to switch his receiver to the second service channel for the duration of the response. This channel switching would normally be unnoticeable on a subscriber's receiver, especially when both service channels have the same VHF frequency.

When it is desired to deliver a message direct to a subscriber having a teletext decoder, this is achieved by directly connecting the teletext channel to that subscriber.

Although in the embodiment described in Figure 2 reference is made to the digital signal received from the head end being in the form of a teletext signal, it will be appreciated that alternative arrangements are possible in which the digital signal is applied to the switching centres in other forms.

The above description assumes a knowledge of conventional teletext systems. Such knowledge can be obtained by reference to the following publications, the contents of which are incorporated herein by reference:

Electronics, Vol. 26; No. 3, August 1980, pages 527 to 554 "Enhanced U.K. Teletext-Moves towards still pictures" by J.P. Chambers, IEEE Transactions on Consumer.

Proc. IEE, Special Issue on Teletext and Viewdata, Electronics Record, Dec. 1979, pages 1417-1424 "Teletext and Viewdata Systems and their possible extension to the U.S.A." by G.D. Crowther and D.S. Hobbs.

CLAIMS

1. A communications system comprising a head end; a plurality of subscriber outlets each provided with a television receiver, a trunk cable network connecting the head end to a plurality of switching centres, and a plurality of subscriber cables connecting the subscribers to the switching centres, signals transmitted over the trunk network from the head end being switched to individual subscribers from the switching centres in response to control signals transmitted to the switching centres from individual subscribers, wherein means are provided at the head end for transmitting to the switching centres a digital signal representative of a message to be delivered to any one subscriber, means are provided at the switching centres for converting the digital signal to an analogue signal suitable for reproduction by a television receiver, and means are provided at the switching centres for selectively connecting the output of the converting means to the cable of the said one subscriber.
2. A communications system according to claim 1, wherein the digital signals transmitted from the head end are conventional teletext signals, and the converting means comprises a teletext signal decoder and an encoder and modulator for producing from the teletext signals an analogue television signal, the

selective connecting means being arranged such that subscribers having receivers capable of receiving teletext signals directly are connected directly to the channel carrying the digital signals, and subscribers having receivers not capable of receiving teletext signals directly are connected to the output of the converting means.

3. A communications system according to claim 1, wherein the digital signals transmitted from the head end are representative of an audio response signal to be delivered to the said one subscriber, and the converting means provides an output modulated on a sound carrier capable of being received by the said one subscriber's receiver.
4. A communications system according to claim 3, wherein the converting means comprises a speech synthesiser responsive to the digital signal to provide an audio output and a modulator for providing an output modulated with the audio output.
5. A communications system according to claim 3, wherein the converting means comprises a decoder providing an audio output and a modulator for providing an output modulated with the audio output.
6. A communications system substantially as hereinbefore described with reference to the accompanying drawings.

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